PROCEDURE USED IN PREPARING ESTIMATES
OF THE COST OF RESTORATION OF BOMB DAMAGED
BRIDGES IN NORTH VIETNAM

An engineering and construction analysis of each bomb-damaged bridge in North Vietnam is conducted in order to prepare an estimate of the cost of repair and restoration. The procedures used in making these construction/engineering analyses are those commonly used by US engineers and estimators when called upon to produce bids for bridge construction jobs in foreign countries.

The cost of construction per lineal foot for various types of bridges found in North Vietnam was established first using several methods of estimating. One method was to select similar US bridges on which construction costs in considerable detail were available. The unit costs for labor, materials and equipment were then adjusted to reflect the economic situation and the availability of material inputs and technical skills in North Vietnam. For example, structural steel and equipment prices in North Vietnam would be much higher because they would have to be imported. The factor costs represented by technical assistance would also be higher because technical assistance must also be imported. Labor costs, on the other hand, would be much less because of the labor intensive methods of construction and repair which predominate in North Vietnam. The counteracting effect of the above items, and other considerations, would tend to make the cost of highway bridge construction in North Vietnam about the same

as that in the US (about $700/lineal foot). As a check against this estimate two independent cost estimates of a hypothetical bridge construction project were prepared and both were within 10 percent of the first method used. As a final independent check reference to

25X1A5A1 estimates prepared by [   ] for the construction of 20? highway bridges in Southeast Asia showed the average cost to be $740 per lineal foot. This latter estimate is within 5½ percent of the results obtained by the methodology used by our intelligence specialists.

Within this degree of accuracy we have, therefore, accepted a highway bridge construction cost of $700 per lineal foot as applicable for the replacement cost of any bridge completely destroyed by bombing.

Actual bomb damage to the bridges in North Vietnam will vary, however, in both nature and degree from complete destruction to superficial damage. Therefore, it is necessary to treat each bridge as an individual problem. Pictures and a "readout" by a photo interpreter are essential to an accurate assessment of the damage. After the readout has been checked by our construction/engineering specialists the percentage of damage to the various components of a bridge is assigned. In assigning this damage a bridge is broken down into the following components: foundations, abutments, piers, and superstructure. Cost relatives for each of these components were determined when the overall cost estimate of $700/lineal foot was made. Only the damaged

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or destroyed components have been considered in estimating the cost of repair or replacement. Furthermore, when only a part of the component is damaged or destroyed only its percent of the whole is considered. In every case observed where the North Vietnamese have attempted more than temporary repairs, their reconstruction effort has been limited strictly to the repair or replacement of the damaged part of the bridge only. They have, therefore, kept repair and replacement costs to a minimum. We have attempted to abide by the same restraints in our estimates rather than to inflate them by assuming a damaged or destroyed bridge would be completely replaced.

Highway bridges have been used as the basis for all estimates. In the case of railroad bridges the costs have been obtained, generally speaking, by doubling highway bridge costs. Railroad bridges are designed to carry much heavier loads. This load requirement means a significant increase in the materials used and much larger and heavier foundations which are more difficult to construct; thus the increased cost.

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To Repair to Original Condition

Highway Br's	174	5,087,000

Railroad Br's (only)

Line 1

Hanoi - Vinh	11	934,000
Vin thru Xom Khe	7	1,206,000

Line 2

Hanoi - Dong Dang	2	205,000

Line 3

Hanoi - Haiphong	0	-

Line 4

Hanoi - Lai Cai	12	812,000
	32	3,157,000

Combination Br's

Line 1

Hanoi - Vinh	6	1,160,000
Vinh thru Xom Khe	2	500,000

Line 2	0	0
Line 3	2	232,000
Line 4	0	0
	10	1,893,000

Grand Total	216 bridges	$10,137,000

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To Repair Temporarily

Highway Br's	143	674,000

Railroad Br's (only)

Line 1

Hanoi - Vinh	8	74,000
Vinh thru Xom Khe	7	102,000

Line 2

Hanoi - Dong Dang	1*	5,000*

Line 3

Hanoi - Haiphong	0	0

Line 4

Hanoi - Lai Cai	3*	23,000*

*Assume these have been repaired

	15	176,000

Combination Br's

Line 1

Hanoi - Vinh	6	50,000
Vinh thru Xom Khe	2	25,000
Line 2	2*	25,000*

*Assume these have been repaired

Line 3	0	0
Line 4	0	0
	8	75,000

Grand Total	166 bridges	$925,000

$$216 \times 5570 \text{ (per Br.)} = 1,203,000 \text{ or about } 10\%$$